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SNAG RECRUITMENT PROJECTS
LUNA RANGER DISTRICT, GILA NATIONAL FOREST

APRIL 1991

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SNAG RECRUITMENT PROJECTS
LUNA RANGER DISTRICT, GILA NATIONAL FOREST

APRIL 1991

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ABSTRACT

Two snag recruitment projects have recently been completed on the Luna Ranger District of the Gila National Forest. The projects were designed for the control of the dwarf mistletoe parasite and to create potential wildlife snags. Results indicate that mortality can be achieved more rapidly using intense basal fires than by using standard mechanical girdling techniques. The recruited snags will be monitored for several years for wildlife use, particularly use by cavity nesting birds.

INTRODUCTION

Two snag recruitment projects have recently been completed on the Luna Ranger District. The Underwood Project was completed in August 1987, and the Luna Project in November 1989. Both projects involved treatments designed to kill dwarf mistletoe-infected ponderosa pine overstory trees. The purpose of this was twofold: (1) To protect young ponderosa pine understories by eliminating major sources of dwarf mistletoe infection, and (2) to create potential wildlife snags in areas considered snag deficient. Both projects were part of Forest Pest Management (FPM)-funded dwarf mistletoe control projects. Forest Pest Management pathologists cooperated with District silviculturists and wildlife biologists in developing and implementing the projects.

The treatments used in both projects were mechanical girdling and burning. Mechanical girdling has been the most commonly used method for creating snags in the Southwestern Region. This method is relatively easy and inexpensive, but has had some major drawbacks. In particular, it has often taken several years for mechanically girdled trees to die. This limits the effectiveness of girdling as a tool for dwarf mistletoe control, since seeds of the parasite can be dispersed for several years following treatment. Another problem with girdling has been the tendency of stems to break off at the girdle. A major objective of these projects, therefore, was to test the effectiveness of intense fire as a girdling tool.

Studies are underway to compare girdling and burning treatments in regard to:

1. The time it takes for mortality to occur.
2. Snag longevity, particularly in regard to stem breakage and windthrow.
3. Use of the snags by wildlife.

METHODS

Girdling was accomplished by cutting two parallel rings four to six inches apart with a chainsaw, and then chipping the bark off with a polaski (Figure 1). Production rates using this method averaged 15 minutes/tree.

Burning was done by piling slash three to five feet high around the base, and igniting with a drip torch (Figure 2). Although some green slash was used, crews included some older wood containing a high pitch content. The pitch was important for providing the intense heat needed to kill the trees. Fires were hot enough to consume and/or blacken the entire bark thickness around the base. However, they were not so hot as to penetrate beyond the cambium into the sapwood, which might have weakened the stem. Efforts were made to keep the fire near the base of the tree, and not climb high on the bole. Although crown scorch was not a concern, it was thought that if fire advanced well up the bole, a hardening effect might limit future use by cavity nesting birds. Production rates using this method were highly variable, but averaged one hour/tree.

Approximately 275 dwarf mistletoe-infected ponderosa pine overstory trees were mechanically girdled in the Underwood Project. Thirty-two trees were selected as sample trees to initiate tests on the effectiveness of intense fire as a

Figure 1. Final stage of mechanical girdling.

Figure 2. Intense basal fire.

girdling tool. These included:

- Eleven of the above-mentioned girdled trees (control group)
- Ten of the above-mentioned girdled trees that were burned
- Eleven additional (ungirdled) trees that were burned

The remainder of the 275 girdled trees have not been formally monitored. Several of them were burned about a year after the original treatment in an effort to hasten mortality.

The more recent Luna Project involved treatment of 70 infected ponderosa pine overstory trees, all of which are being carefully monitored. Thirty-three of these trees were burned, and 37 were mechanically girdled. About half of these trees were treated in August 1989, and the other half in November 1989, so that comparisons could be made on the effectiveness of summer and winter treatment. The treatment area consisted of four stands totalling 126 acres.

RESULTS

UNDERWOOD PROJECT

1. Crown Decline/Mortality

The first post-treatment observations were made in November 1987, three months after treatment. At that time, no significant changes in crown condition were reported.

By April 1988, eight months after treatment, five of the ungirdled/burned trees showed fading in over fifty percent of the crown. The other sample trees were still largely green.

By October 1988, fourteen months after treatment, seven (64 percent) of the ungirdled/burned trees had died (100 percent brown needles). Average DBH of these was 12.7". The four ungirdled/burned trees still alive averaged 19.7" DBH. Only one of the girdled/burned trees, and none of the girdled/unburned trees had died.

The next formal observations were made in October 1990, approximately three years after treatment. At that time, thirty-one of the thirty-two study trees were dead. Strangely enough, the one remaining live tree had received dual treatment.

2. Snag Longevity

In June 1988, unusually strong winds caused considerable stem breakage and uprooting within the project area. In one stand, seven trees broke off at the girdle; however, none of these were study trees. Apparently, excess girdle depth (averaging two inches into the sapwood) was a major contributing factor. However, at some locations untreated trees blew over, while adjacent girdled trees did not. Furthermore, some untreated trees broke off near the ground at "girdle level."

By October 1990, three of the thirty-two sample trees (nine percent) had blown over. Two of these, both girdled/unburned, broke off at the girdle, and the

third, girdled and burned, was uprooted. Additional windthrow of nonsample trees was observed within the project area.

3. Wildlife Use

By October 1990, three years after treatment, twenty-seven of the twenty-eight standing snags (96 percent) had bird drill holes in them. The frequency of drill holes ranged from very few to numerous. There seemed to be no significant relationship between either treatment type or DBH, and the frequency of drill holes. Pygmy nuthatches and an acorn woodpecker were seen on two of the larger snags.

LUNA PROJECT

Observations were made in August 1990, twelve months after summer treatments and nine months after winter treatments. Following is a summary of these observations:

1. Mortality

Treatment	Mortality	
summer burn	10 of 16 trees	(62%)
winter burn	9 of 17 trees	(53%)
summer girdle	1 of 23 trees	(4%)
winter girdle	0 of 14 trees	(0%)

Average DBH of burned trees that were dead: 13.3"

Average DBH of burned trees still alive: 16.1"

2. Snag Longevity

All 70 of the sample trees were still standing, including the 20 snags.

3. Wildlife Use

Seven of the 70 sample trees (ten percent) had woodpecker drill holes in them. Four of these were dead, while the other three still had over 50 percent live crown.

FUTURE STUDIES

The snags in the Underwood Project will be monitored annually, or at least every two years, for the next four to six years. This will provide additional information on snag longevity and use of the snags for nesting and roosting.

Treated trees in the Luna Project will be monitored every six months for the next two years, and annually thereafter, until mortality is complete.

Monitoring for snag longevity and wildlife use will continue annually or every two years, for a minimum of six to eight years.

DISCUSSION

Probably the most important conclusion that can be drawn from these projects so far is that burning results in more rapid mortality than mechanical girdling. In both projects, over half of the burned trees died within one year. Only one out of 35 mechanically girdled sample trees died this quickly.

In the Underwood Project, the eleven mechanically girdled sample trees all died within three years. Past observations from Region 3 and elsewhere indicate that mechanically girdled trees often take five to seven years, or even longer, to die. Pretreatment vigor and site conditions probably affect this time frame.

Differences in vigor, site conditions, and possibly fire intensity could account for the confounding results involving the trees that were both girdled and burned. These trees took much longer to die than those that were just burned. Whatever the reason for this, it seems safe to say that there is no advantage to the dual treatment.

Burning appears to be the preferred snag-recruitment method for dwarf mistletoe control purposes since it will eliminate major sources of infection more quickly than mechanical girdling. Although burning is more time consuming than mechanical girdling, it is probably more cost-effective because it will provide better results, i.e., lower levels of infection in the understory. Also, while labor costs (time) for burning are roughly four times that of mechanical girdling, actual cost differences are relatively minor when other factors such as planning, selection of "recruits," transportation, and monitoring are considered.

Besides being a more effective tool for the control of dwarf mistletoe, burning may also provide longer-lived snags, which would result in greater wildlife benefits. The cuts used in mechanical girdling often penetrate the sapwood, creating weak points that can result in stem breakage. Burning makes stems harden at the base, which may make them resistant to breakage. It is also conceivable that the charred, hardened bases on burned snags would make them less attractive targets for woodcutters than mechanically girdled ones. The latter have been highly sought after in some locations.

We should emphasize, however, that it is too early in the study to make any definite conclusion about which method is better for wildlife. Observations over the next several years should reveal whether or not these artificially produced snags will support cavity-nesting populations. We can think of no reason why they should not, given sufficient time for normal decay processes to occur. At the present time we know that considerable foraging by insect-feeding birds can occur on both types of snags. Drill holes were observed on nearly all the sample trees of the Underwood Project three years after treatment.

A larger sample of trees is being monitored from the Luna than the Underwood Project (70 vs. 32 trees) so the Luna Project should provide more reliable information on the two snag recruitment techniques. More complete statistical analysis can be done for these projects after several years of additional

monitoring. Forest Pest Management will prepare a followup report in three to five years, as appropriate.

With the results to date, we believe that the burning method can be an excellent way to protect young regeneration from dwarf mistletoe infection, particularly in areas with wildlife emphasis. Results from the Luna Project suggest that treatment can be done successfully any time of year. We believe that the burning method may have real operational potential for promoting long-term forest health in the Southwest. It is interesting to reflect that fire, which was nature's way of controlling dwarf mistletoe, might be used effectively in an artificial manner to help control the parasite.